

SUBJECT TEACHING GUIDE

M1993 - STANDARD MODEL OF PARTICLE PHYSICS

Master's Degree in Particle Physics and the Cosmos

Academic year 2022-2023

1. IDENTIFYING DATA					
Degree	Master's Degree in Particle Physics and the Cosmos			Type and Year	Compulsory. Year 1
Faculty	Faculty of Sciences				
Discipline	PARTICLE PHYSICS AND PHYSICS OF THE COSMOS				
Course unit title and code	M1993 - STANDARD MODEL OF PARTICLE PHYSICS				
Number of ECTS credits allocated	6	Term	Semester based (1)		
Web					
Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. FISICA MODERNA				
Name of lecturer	PABLO MARTINEZ RUIZ DEL ARBOL				
E-mail	pablo.martinez@unican.es				
Office					
Other lecturers	JORGE DUARTE CAMPDERROS				

3.1 LEARNING OUTCOMES

- To know the Standard Model of Particle Physics
- Understand the role of symmetries in Particle Physics
- Understand the mathematics of the fundamental interactions
- Be able to perform calculations of physical observables
- Understand the precision possible/required in the comparison theory/experiment
- Be able to find information on the advance of the theory and experimental results, techniques used in the field, and prepare and defend scientific reports

4. OBJECTIVES

Basic knowledge on Quantum field Theory
 Advance knowledge of the Standard Model of Particle Physics
 To be able to perform calculations in the frame of the quantum field theory
 To be able to interpret the experimental results and its comparison with theoretical predictions
 Learn the fundamental aspects of extensions beyond the Standard Model and its experimental aspects.

6. COURSE ORGANIZATION

CONTENTS

1	<p>Basic concepts of the ME of Physics of Particles. Introduction to Quantum Field Theory. Klein Gordon field. Dirac's equation. Interaction between particles. Feynman diagrams.</p> <p>Electromagnetic field. Electron-positron annihilation Field of massive vector bosons. Theories with invariance "gauge". Yang-Mills theories, Quantification of non-Abelian "gauge" theories. Electroweak interaction. Spontaneous break of symmetry. Higgs mechanism. Processes basic Basic concepts of QCD. Deeply inelastic dispersion. ME test Phenomenology</p> <p>Extensions of the standard model. Lagrangians supersymmetric. Other BSM models. Phenomenology.</p>
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7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Written exam that could be replaced by final homework and class presentations.	Work	Yes	Yes	60,00
Written exam that could be replaced by final homework and class presentations.	Work	Yes	Yes	40,00
TOTAL				100,00
Observations				
There will be oral presentations that in case could replace the written exam The written exam could be recuperated in an interval of a month (aprox.)				
Observations for part-time students				
If necessary the calendar will be adapted to the availability of the students attending at partial time. The evaluation will follow general criteria				

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC

Modern Particle Physics, M. Thomson
 Nuclear and Particle Physics. B.R. Martin
 Particle Physics B. R. Martin

